

**In the claims:**

**Cancel claims 2, 7-9, 12 and 16-18.**

**Amend claims 34-39 where indicated.**

1.- 33. (Cancelled)

1           34.   (Currently Amended)   ~~A magnetic head assembly as claimed in claim 2 further~~  
2 ~~comprising:~~ A magnetic head assembly having an air bearing surface (ABS) comprising:  
3           a read head including:  
4                   first and second ferromagnetic shield layers;  
5                   a read sensor recessed from the ABS and which includes a ferromagnetic free layer;  
6                   a ferromagnetic flux guide magnetically connected to the read sensor and extending  
7 from the read sensor to the ABS for conducting field signals to the read sensor;  
8                   each of the read sensor and the flux guide being located between ferromagnetic first  
9 and second shield layers;  
10                   a distance between the first and second shield layers at the ABS being less than a  
11 distance between the first and second shield layers at the read sensor; and  
12                   a longitudinal biasing stack (LBS) magnetically coupled to the free layer for biasing  
13 a magnetic moment of the free layer parallel to the ABS and parallel to major planes of the  
14 layers;  
15           the LBS including:  
16                   a hard bias layer; and  
17                   a nonmagnetic metal spacer layer located between and interfacing the free layer and  
18 the hard bias layer;  
19           each of the free layer, hard bias layer and spacer layer having top and bottom large surfaces  
20 which are bounded by front and rear surfaces and first and second side surfaces wherein the front  
21 surfaces form a portion of the ABS and each of the top and bottom large surfaces has a larger surface  
22 area than each of the front and rear surfaces and each of the first and second side surfaces and is  
23 perpendicular thereto; and  
24           each of the top and bottom large surfaces of the spacer layer interfacing a respective large  
25 surface area of the free layer and the hard bias layer.

1           35.   (Currently Amended)   ~~A magnetic head assembly as claimed in claim 2 further~~  
2 ~~comprising:~~ A magnetic head assembly having an air bearing surface (ABS) comprising:  
3       a read head including:  
4           first and second ferromagnetic shield layers;  
5           a read sensor recessed from the ABS and which includes a ferromagnetic free layer;  
6           a ferromagnetic flux guide magnetically connected to the read sensor and extending  
7 from the read sensor to the ABS for conducting field signals to the read sensor;  
8           each of the read sensor and the flux guide being located between ferromagnetic first  
9 and second shield layers;  
10          a distance between the first and second shield layers at the ABS being less than a  
11 distance between the first and second shield layers at the read sensor; and  
12          a longitudinal biasing stack (LBS) magnetically coupled to the free layer for biasing  
13 a magnetic moment of the free layer parallel to the ABS and parallel to major planes of the  
14 layers;  
15       the LBS including:  
16           a hard bias layer; and  
17           a nonmagnetic metal spacer layer located between and interfacing the free layer and  
18 the hard bias layer;  
19       the read sensor having a sensor stripe height and the flux guide having a flux guide stripe  
20 height; and  
21       dielectric layers electrically insulating some of the layers of the read head along the flux  
22 guide stripe height except along the sensor stripe height.

1           36.   (Previously Presented)   A magnetic head assembly as claimed in claim 35 further  
2 comprising:  
3       each of the free layer, hard bias layer and spacer layer having top and bottom large surfaces  
4 which are bounded by front and rear surfaces and first and second side surfaces wherein the front  
5 surfaces form a portion of the ABS and each of the top and bottom large surfaces has a larger surface  
6 area than each of the front and rear surfaces and each of the first and second side surfaces and is  
7 perpendicular thereto; and  
8       each of the top and bottom large surfaces of the spacer layer interfacing a respective large  
9 surface area of the free layer and the hard bias layer.

1           37.   (Currently Amended)   ~~A magnetic disk drive as claimed in claim 12 further~~  
2 ~~comprising:~~ A magnetic disk drive including:  
3           a read head including:  
4               first and second ferromagnetic shield layers;  
5               a read sensor recessed from the air bearing surface (ABS) and which includes a  
6               ferromagnetic free layer;  
7               a ferromagnetic flux guide magnetically connected to the read sensor and extending  
8               from the read sensor to the ABS for conducting field signals to the read sensor;  
9               each of the read sensor and the flux guide being located between ferromagnetic first  
10              and second shield layers;  
11              a distance between the first and second shield layers at the ABS being less than a  
12              distance between the first and second shield layers at the read sensor; and  
13              a longitudinal biasing stack (LBS) magnetically coupled to the free layer for biasing  
14              a magnetic moment of the free layer parallel to the ABS and parallel to major planes of the  
15              layers;  
16              the LBS including:  
17                  a hard bias layer; and  
18                  a nonmagnetic metal spacer layer located between and interfacing the free layer and  
19                  the hard bias layer;  
20              each of the free layer, hard bias layer and spacer layer having top and bottom large surfaces  
21 which are bounded by front and rear surfaces and first and second side surfaces wherein the front  
22 surfaces form a portion of the ABS and each of the top and bottom large surfaces has a larger surface  
23 area than each of the front and rear surfaces and each of the first and second side surfaces and is  
24 perpendicular thereto; and  
25              each of the top and bottom large surfaces of the spacer layer interfacing a respective large  
26 surface area of the free layer and the hard bias layer[. . .];  
27              a write head including:  
28                  ferromagnetic first and second pole piece layers that have a yoke portion located  
29                  between a pole tip portion and a back gap portion;  
30                  a nonmagnetic write gap layer located between the pole tip portions of the first and  
31                  second pole piece layers;  
32                  an insulation stack with at least one coil layer embedded therein located between the  
33                  yoke portions of the first and second pole piece layers; and

the first and second pole piece layers being connected at their back gap portions;  
a housing;  
a magnetic disk rotatably supported in the housing;  
a support mounted in the housing for supporting the magnetic head assembly with said ABS  
facing the magnetic disk so that the magnetic head assembly is in a transducing relationship with the  
magnetic disk;  
a spindle motor for rotating the magnetic disk;  
an actuator positioning means connected to the support for moving the magnetic head  
assembly to multiple positions with respect to said magnetic disk; and  
a processor connected to the magnetic head assembly, to the spindle motor and to the actuator  
positioning means for exchanging signals with the magnetic head assembly, for controlling  
movement of the magnetic disk and for controlling the position of the magnetic head assembly.

38. (Currently Amended) ~~A magnetic disk drive as claimed in claim 12 further~~  
~~comprising:~~ A magnetic disk drive including:

a read head including:

first and second ferromagnetic shield layers;

a read sensor recessed from the air bearing surface (ABS) and which includes a  
ferromagnetic free layer;

a ferromagnetic flux guide magnetically connected to the read sensor and extending  
from the read sensor to the ABS for conducting field signals to the read sensor;

each of the read sensor and the flux guide being located between ferromagnetic first  
and second shield layers;

a distance between the first and second shield layers at the ABS being less than a  
distance between the first and second shield layers at the read sensor; and

a longitudinal biasing stack (LBS) magnetically coupled to the free layer for biasing  
a magnetic moment of the free layer parallel to the ABS and parallel to major planes of the  
layers;

the LBS including:

a hard bias layer; and

a nonmagnetic metal spacer layer located between and interfacing the free layer and  
the hard bias layer;

the read sensor having a sensor stripe height and the flux guide having a flux guide stripe height; and  
dielectric layers electrically insulating some of the layers of the read head along the flux guide stripe height except along the sensor stripe height[.];  
a write head including:  
ferromagnetic first and second pole piece layers that have a yoke portion located between a pole tip portion and a back gap portion;  
a nonmagnetic write gap layer located between the pole tip portions of the first and second pole piece layers;  
an insulation stack with at least one coil layer embedded therein located between the yoke portions of the first and second pole piece layers; and  
the first and second pole piece layers being connected at their back gap portions;  
a housing;  
a magnetic disk rotatably supported in the housing;  
a support mounted in the housing for supporting the magnetic head assembly with said ABS facing the magnetic disk so that the magnetic head assembly is in a transducing relationship with the magnetic disk;  
a spindle motor for rotating the magnetic disk;  
an actuator positioning means connected to the support for moving the magnetic head assembly to multiple positions with respect to said magnetic disk; and  
a processor connected to the magnetic head assembly, to the spindle motor and to the actuator positioning means for exchanging signals with the magnetic head assembly, for controlling movement of the magnetic disk and for controlling the position of the magnetic head assembly.

39. (Currently Amended) A magnetic head ~~assembly~~ disk drive as claimed in claim 38 further comprising:

each of the free layer, hard bias layer and spacer layer having top and bottom large surfaces which are bounded by front and rear surfaces and first and second side surfaces wherein the front surfaces form a portion of the ABS and each of the top and bottom large surfaces has a larger surface area than each of the front and rear surfaces and each of the first and second side surfaces and is perpendicular thereto; and

each of the top and bottom large surfaces of the spacer layer interfacing a respective large surface area of the free layer and the hard bias layer.

**Add new claims 40-47.**

1           40.   (New)   A magnetic head assembly as claimed in claim 34 further comprising:  
2           the flux guide including an extension of the free layer which extends from the sensor to the  
3   ABS;  
4           the read sensor further including:  
5                 a ferromagnetic pinned layer that has a magnetic moment;  
6                 an antiferromagnetic pinning layer exchange coupled to the pinned layer for pinning  
7           the magnetic moment of the pinned layer; and  
8                 a spacer layer located between the pinned layer and said free layer; and  
9           said pinned layer, pinning layer and spacer layer being located only in said read sensor.

1           41.   (New)   A magnetic head assembly as claimed in claim 40 wherein the spacer layer  
2   is a nonmagnetic electrically nonconductive barrier layer.

1           42.   (New)   A magnetic head assembly as claimed in claim 35 further comprising:  
2           the flux guide including an extension of the free layer which extends from the sensor to the  
3   ABS;  
4           the read sensor further including:  
5                 a ferromagnetic pinned layer that has a magnetic moment;  
6                 an antiferromagnetic pinning layer exchange coupled to the pinned layer for pinning  
7           the magnetic moment of the pinned layer; and  
8                 a spacer layer located between the pinned layer and said free layer; and  
9           said pinned layer, pinning layer and spacer layer being located only in said read sensor.

1           43.   (New)   A magnetic head assembly as claimed in claim 42 wherein the spacer layer  
2   is a nonmagnetic electrically nonconductive barrier layer.

1           44.   (New)   A magnetic disk drive as claimed in claim 37 further comprising:  
2           the flux guide including an extension of the free layer which extends from the sensor to the  
3   ABS;  
4           the read sensor further including:  
5                 a ferromagnetic pinned layer that has a magnetic moment;

6           an antiferromagnetic pinning layer exchange coupled to the pinned layer for pinning  
7           the magnetic moment of the pinned layer; and  
8           a spacer layer located between the pinned layer and said free layer; and  
9           said pinned layer, pinning layer and spacer layer being located only in said read sensor.

1           45.   (New)   A magnetic disk drive as claimed in claim 44 wherein the spacer layer is a  
2           nonmagnetic electrically nonconductive barrier layer.

1           46.   (New)   A magnetic disk drive as claimed in claim 38 further comprising:  
2           the flux guide including an extension of the free layer which extends from the sensor to the  
3           ABS;  
4           the read sensor further including:  
5                a ferromagnetic pinned layer that has a magnetic moment;  
6                an antiferromagnetic pinning layer exchange coupled to the pinned layer for pinning  
7                the magnetic moment of the pinned layer; and  
8                a spacer layer located between the pinned layer and said free layer; and  
9                said pinned layer, pinning layer and spacer layer being located only in said read sensor.

1           47.   (New)   A magnetic disk drive as claimed in claim 46 wherein the spacer layer is a  
2           nonmagnetic electrically nonconductive barrier layer.